Sir Alan Rudge

Interviewed by

Richard Sharpe

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Welcome to the Archives of Information Technology, where we capture the past and inspire the future. It is Friday the 9th of November 2018, and I am Richard Sharpe, and I have been covering the IT sector and researching and writing it since the early 1970s.

We're in the London home of Sir Alan Rudge, and he has been described as one of the top technical minds in the country. And he has a very varied background, has contributed significantly to the technologies of information technology.

Sir Alan, what did your parents do?

Well my father died before I met him so to speak, when I was three years old. And, my mother was a housewife until then, and then, during the war took up war work to obviously keep her two children. My early education was much disrupted by the war, I must have gone to eight schools, eight different schools, for a short time generally in each, one year perhaps. And, therefore, I failed to get into the normal channels of education, and by the time I was, about twelve, when I went to my final school, is one I did stay at for five years, I had, my mother knew nothing about education, my father would have been the person who, who understood it all, and, just sent me off to the nearest school. And so, I did five years at a secondary modern school, which was a new experiment at the time by the Government. And, the most that did for me, the teaching wasn't very great, I made bad choices pretty much all the way through, and so that I ended up with very poor qualifications at the end of it. They did take a few of us and try us out on GCE, it wasn't the norm in secondary schools to do GCE, and I passed all the ones that I took, but I, I took things, some useful, English language, English literature, history, but the other subjects, I did no maths, no physics. I did sort of early economics, and shorthand and typing.

Would you describe yourself as a particularly academic child?

I didn't have much chance to be academic as a child; it was more survival than… If you keep, a youngster keeps going to new schools all the time, it's more to do with survival than it is with education.

Yes. Having to meet new friends, make new friends et cetera.

Yes.

And being the new boy on the block.

Exactly. And I was evacuated at the beginning of the war. But, I wasn't very well treated, so my mother came and got me back again. And, I lived in London during the first part of the Blitz, and then, she, we all moved out, she bought a house in Lincolnshire, and we moved out there.

[03:05]
And did you do your National Service straight after school?

No. [pause] After school I went to work in a bank, in the City. Which, I soon decided that it wasn't really what I wanted to do. And I tried to change my job at that time, I had decided I wanted to do journalism. And I had one or two interviews, and, quite promisingly. But then, the question always came up, what were your commitments regarding National Service? And as soon as I said, 'Well I haven't done it yet,' they said, 'Well, why don't you come back and see us afterwards.' Because nobody wanted to keep a job open for two years, as they had to, for National Service. So, at that time I wrote to the Ministry of Defence and said, 'Hey, how about me?' And ten days later I was, I was called up. And so, then I spent… I was very determined in the services not to get a clerical job, which I knew I didn't like at all. And so… I met a chap on a train, an RAF guy, and he was talking about radar. So I thought, well that sounds interesting. So, when I was interviewed by the people at, the RAF people, I said, 'Oh I'm really keen on radar.' Not even knowing what radar was at the time, but... Anyway, that led me into doing an air radar mechanic's course.

So you were in the RAF, the mechanics school. And also, you became a radar mechanic, did you?

Yes, I did, air radar mechanic. So I serviced radars on aircraft squadrons in Germany.

And this taught you the basics of…

Well it got me interested, it got me interested. Taught me the basics, and, it was a bit of a struggle at first, because I knew no maths whatsoever, so I had to struggle along. And, it taught me the basics. But also, I met people who were qualified, technically qualified, and I realised that I had no qualifications at all, and therefore my prospects in life were not very good.

Right.

[05:08]
So I was determined that when I came out of, when I had completed my National Service, I would start again. And so I started with evening classes. Fortunately, I went to work in a telecoms factory, got a job in a telecoms factory, and they, for reasons I needn't go into, they allowed me day release. And then I did day release and evening classes.

At the good old City and Guilds.

City and Guilds, yes. Yes. That was where I started. And then I did some ONC. Effectively, I took very examination that anybody put in front of me, with no knowledge of where I was going at all, other than, I needed to get qualified in something.

Right.

And, I, I did all those courses, and passed them quite well. And then came the next step. And I decided at that stage, I was 21, twenty… no, 23, I decided I would go to college full-time. Unfortunately the qualifications I had didn't qualify me for the normal channel, you know, I couldn't go and do a first degree course, because I didn't have the right entry qualifications. But I went to London, and I was interviewed at the polytechnic in Regent Street, and the head of department there must have seen something, because he said, 'Well, you could do our diploma in the electrical engineering course, which would qualify you for the Institution of Electrical

Engineers, Chartered Engineer status.' So I thought that sounded a sensible thing to do. So I did that. And I did very well on the course, and it was a three-year course. I got Distinction, and the Governor's Medal, and one or two things.
[06:45]
So, with that, I then approached… I decided I wanted to do an MSc, perhaps to get into the channel at that point. And so I applied to the University of Birmingham that were doing the first information theory courses at the time. And, again I was interviewed, and again they said to me, 'Well you can't do the degree, but you could do the course, and if you pass it, you could get a diploma.' So, I said, 'Fair enough.' And, so I did the course. And it was a very international course at that time, a lot of foreign students, from the Commonwealth mostly. And, I passed the course, and at the end of it, I had been doing a project, and they said, 'We like what you are doing on the project. Would you be interested in staying and doing an MSc by research?'

What was your project?

My project was, it was a problem at the time with large, the large parabolic antennas that were being used for Sputnik and the like, and for, for astronomy. And, these were designed for a lower frequency, and they wanted to use them, one of them at least, at a higher frequency. And the surface wasn't good enough. And so the question was, would it be possible to collect the distorted energy at the, round the focus, and sort it out, and put it together as though there were no errors in the dish? OK. So that was my problem. So, I made some progress on this, and so they asked me to stay for an MSc. And I made more progress on it while I was doing the MSc. And they asked me if I would be interested in, instead of taking the MSc, stay on and do a PhD. And so that's, the first time I got a qualification that was in line with the system was a PhD, in Birmingham.

An interesting route then. So this is City and Guilds, and then, one of the most famous old polys, then to Birmingham, and then you get the, the imprimatur, the official, the official step.

Right.

[08:45]
And very interesting that your project is very practical.

Well it's practical, but, what it was more than anything, and which disturbed me when I was offered it, was that it was very theoretical, and it's very mathematical. Because, what you wanted is not just to do something, but actually to analyse it, to find out where the electromagnetic energy is, how you can collect it, and whether you can sort it out theoretically before you do any experiments. I did manage to do that. And, and then, I hired the, well borrowed the big dish at, got Jodrell Bank to do the experiments. And indeed it worked, so, to a degree.

So here is the combination of theory and practical.

Oh yes. Yes.

Right.

And in fact it was my big concern when I was offered the project that it was very mathematical. Antenna theory is very mathematical, electromagnetics. And, again, I had to work at it quite hard to, you know, to, to the point that, you know, Fourier transforms became like arithmetic to me. I mean I know them inside-out. But… But, that sort of, transforms and God knows what. But, anyway, it was a, an exercise in kind of, expanding my mathematical side from the top instead of from the bottom. I had taught myself some maths to get as far as I had, but I had to extend it.

Indeed it's one of your published books, isn't it, aerials? You wrote…

Yes, that's right. Yeah.

You're an expert on aerials.

Yes, I became, quite strangely, because if anyone had said to me when I went to do my PhD project, or what became a PhD project, 'What would you not want to do?' I

would have said, antennas. Because, they're very mathematical, and I thought, that wasn't my strong point. But anyway, I managed to master it.
[10:30]
After I completed my PhD, I joined the brain drain. I tried several interviews in the UK, and I wasn't very impressed with the, with the jobs on offer. I mean, jobs were offered, but I didn't like the, I didn't like the set-up very much.

What was it that you didn't like?

One thing was, the feeling that you, you went back and sort of, you were a sort of, apprentice. They didn't really accept, to a great extent, you know, the value of the PhD in a lot of the places I was interviewed. And though they offered, each of them offered me a job, in industry at that time, I was looking for a bit more adventure than that. So I emigrated to the US. And I got a job in an institution, Illinois Institute of Technology, research institution, which was the old Armour Research Foundation, previously.

This is 1968.

Yes. 1968. And, when I arrived there, it turned out that they had a large project, but the person in charge had left before I arrived. So, I arrived, this neophyte, and, to inherit the project. And, the project was for Vietnam. Which turned out just as well, because of the draft. I was then, drafted then to the American services, but managed to get exemption due to the project I was working on. Anyway, the project was a ministry of defence, partner defence project. And I ended up on my own so to speak with technician support to, to design and build this special system, which I did.

[12:23]
And this was in Chicago?

This was in Chicago, yes.

How did Chicago strike you?

Well first of all, not, not very promising really. But after a while I got used to Chicago. And at the time one could get out of Chicago quite easily, and there was thousands of miles of prairie not too far away. And I quite enjoyed exploring America so to speak from there, by car. And so…

And you're almost slap bang in the middle aren't you, in the middle.

Exactly.

You were in the Midwest.

Yes. And the lake, Lake Michigan is, is, you know, 300 miles long. I mean it's a sea. And, with lots of beaches and things like that. So once… I moved out of… I mean first of all I lived downtown in Chicago, on the south side, just, a few blocks off the ghetto as it turned out, but new apartment buildings. And then, when I got married I moved to the North Shore. And, and then Northwestern University. And, it was very, Evanston, it was very pleasant. I'd have stayed in America, because I was doing well in the institution that I worked in, but my wife was, wanted to go back to, when we had a child she wanted to go back, and educate my daughter in England. So we returned.

[13:36]
'68, '69, '70 to '71, very turbulent political and social years…

They were, they were.

…in the United States. How did that strike you?

Well the strange thing was that, you know, Chicago was a hotbed of, of problems in that regard, but we kind of lived outside [laughs], around it. And, you took, you know, you took certain care where you were at different times. But, we never got involved in any, any real problems. Even though there were the riots in Chicago at that time, and, you know, my wife was working downtown, and I was working on the edge of the, on 31st Street, which was the edge of the ghetto area. The institution was,

often the educational institutions were often parked there, to restore the areas. That was a technique. But, you know, other than a few minor incidents, nothing of great, great accord. We managed to live there quite comfortably, and, and… As I say, I would have stayed in America, probably not in Chicago, but I would have stayed in America had, had my wife not wanted to come back to the UK.
[14:48]
She did, and I applied for a job that was on offer at the University of Birmingham, where I had been educated, and, I was shovelled in really. I mean, you know, they decided they want me, wanted me to come back, so, that was it. I went back to, to the university, and I taught there for three years and did research there. But…

Again, what was your area of research?

Antennas again.

Still antennas?

Yes. Yeah. I, I got contracts with the Ministry of Defence, and I got contracts with the European Space Agency, to work on spacecraft problems, and to work on military radar and communication problems. So my research was aimed at that. I wasn't very comfortable, because, the university was a very conservative department, large department. Promotion was, you know, dead men's shoes. And, the fact that I brought in quite a lot of money on these research projects was not regarded much by the department. So I had to do all the work myself. I had employ, I employed one person, and, and I still had to do all the duties of my lectureship, which, you know, being the new boy was often the least interesting. And I, I tried to talk them into the idea of setting up a, an independent research organisation on the university, where people would go and work for long periods, you know, for periods between their teaching. But, you know, it was not welcome.
[16:28]
So I decided after, after three years, that I would not stay in the academic world. And I had to decide what to do next. So…

There is a pattern of three years here all the time, isn't there.

Yes, there was, three years was kind of, ingrained at the time. And, three years is just about long enough to, to know whether, what's going on really. The first year is a struggle; the second year you're getting on top of it; and the third year it's becoming easy. And, I had to prepare all my lectures and so on and so forth, so the first year was quite hard work.

[16:59]

So, what I did, I had a think about it, and what I decided to do, in the summers of, in the summer vacations of, of the university, I had always gone back to America and worked in the institute again. They wanted me back there. And so I went and worked the summers for them, and then I'd come back and, and work at the university. And, so I thought, well if they're so interested, then I'll go and see if they want to set up an independent research organisation in the UK. Because there wasn't one, of the type that I wanted. I didn't want to go to industry. I didn't like the university situation, because there wasn't enough expansion. So I went back to America, and I said to them, 'How about setting up an activity in the UK?' To my surprise, they were receptive. And I didn't know at the time, I only found out why they were receptive afterwards. They thought it would fail, and they thought it was just a way of recruiting me again, because, what they did, they offered me a deal where they said, 'We'll give you a year, and if you can get this thing going in a year, we'll continue to support it, but if you don't get it going, you'll come back and work for us in America.' So that was the arrangement.

It wasn't very long, was it…

No, they didn't give me very long.

…to make it a success.

[18:14]

No, twelve months. And, so, before I left the university, I started writing proposals, and, what happened was, I was looking… The first time I wrote a business plan for them, and they looked at it, they came over to England and looked at it, and, the big hang-up in Britain at that time was accommodation. To do antenna work I needed

some space, and I needed a building. And the only things we could find were sort of, 25-year leases. And that didn't go down well with them at all, because obviously I didn't know what their game plan was, but, that didn't, they didn't want to sign up for a 25-year lease. So they said to me, 'If you can find a location, which doesn't involve a 25-year lease, then we have a deal. But if you don't, then, you know, that's it.' So I started looking round, and a friend introduced me to someone who had seen an ad in, in a magazine, from the Electrical Research Association, which was located in Leatherhead. And they were in hard times, and they were looking for people to come and rent space essentially. So I trotted along there, and I said, you know, 'I'd like to rent space, and what's more, I'd like to buy services from you.' I didn't want to set up finance and, you know, all the, all the other detail. I had enough trouble setting up the technical side. So, anyway, I did a deal, and they agreed to supply services, and to give me space. And that's, I started what was called the RF Technology Centre. Now this was a bit of a setback to my friends in America, because they hadn't thought I'd get that far.

[19:48]

But anyway, they stuck to their word, they supplied me with some money, and, and equipment. I took equipment from America to equip this laboratory. And I applied for proposals, I made proposals to the Ministry of Defence and to the European Space Agency, both of whom I had some relationship with because of my university work. And anyway, I won contracts from both. And I started recruiting people and building up the team to do this work. And the first people I recruited were PhDs to do the kind of work I was doing. And, we started to grow.

[20:26]

So, you're becoming now a manager as well.

Well, initially it was, 90 per cent technical work and ten per cent management. But as the thing grew, it began to become more and more manageable. And in the end, after five years I was faced with a choice, either I was going to have to find somebody to do the management, and I'd stick to the technical work, which I, I liked doing, or, I was going to have to manage it myself. Having managed it that far, you know, as one had sort of thing. And, in the end I decided that I, I couldn't trust anybody else to do it, so I'll have to do it myself. And that's, when I was 42 I started to do more

management than research. I did still work with the guys, but, you know, I didn't take the projects on personally.

Did you miss the technical side?

Yes, I did at first. And then it was… It wasn't an easy decision for me, because I was, I had set this thing up, this whole thing, the Radio Frequency Technology Centre, I had set up as a place where I could go to work. I had no financial ambitions at all, other than it had to, it had to break even, and it had to make money, to satisfy the owners. Because I gave the thing away essentially to, first of all to the Americans, and then, the people running the Electrical Research Association got embarrassed because I was growing and they were shrinking. And in the end they put pressure on me and said, 'We either become partners or we're going to stop this arrangement.' So, I made them partners, and the Americans. So, every step of the way I was doing the management to create opportunities for me to do technical work that I wanted to do. And in the end, because of the growth of it, and the, the running between America and the UK, and keeping both sides pacified, and so on and so forth, such that I couldn't do both. And, I started to switch into technical management in a sense.

[22:18]
Are you a good manager?

Well most of my career from then on has been management. Now am I good manager? I… I think, and it sounds like ego this, but, I, I think, I solve problems. If you gave me some difficult problem… All my career has been faced with what looks like very difficult problems, and every time I've made a fair job of it, OK. And, I don't think management was very difficult. I was never given anything on a plate. What happened was, my Radio Frequency Technology Centre kept growing, to the Americans' dismay, to some degree. The Electrical Research Association got more and more embarrassed, because I was like a cuckoo in the nest, taking more and more space with my people. And I got up to about 40 people doing this, this kind of work.

40 people?

Yes. And I actually, had to create and build a numerically controlled machine shop, because the kind of stuff we did required very fine machining, and I couldn't find it in the UK. And so I acquired the machinery, and, and we built it, a machine shop that could actually create microwave components. They have to be very finely machined. [23:31]

So, this activity grew, and ERA got a bit embarrassed, and in the end they, they and the Americans fell out. They had an argument at a board meeting when I wasn't present, and the reason I wasn't present, my house got burgled. And, I didn't turn up at the board meeting. It was in the UK. They used to come over every six months. It was in the UK, the meeting. And I didn't arrive, because my house was burgled, and I was occupied elsewhere. And they fell out. This was always happening, and I was always the person that made the peace and... I had to rewrite… Every, every paper that the English guys wrote, I rewrote in American, and every paper that the Americans wrote, I rewrote in English. I learnt all about running multicultural systems, you know, because, I realised, the language appears to be the same, but it's different. The understandings, they would fall out over all sorts of things. When I get to the root of them, it was, it wasn't that serious, and I could solve the problem. But the misunderstandings immediately flared up into disagreements. In the end it got to the point that I was spending too much of my time doing this, and on this particular occasion they fell out badly. And the Americans said, 'We're pulling out. We're sending the trucks, we're pulling everything out. We've got a job for you. Or,' they said, 'you can have the, own it. We'll give it to you.' OK? So… But they were only giving me half, you understand, and my problem was, all of the contracts had been written by ERA. I had used them because they were an X-rated organisation, and a lot of the work I did was, was, had to be classified.

Surely.

So I couldn't just easily say, fine, I'll go and own it myself. So in the end, I made overtures to the Americans, I stroked them and did everything else, and eventually they sold the business to ERA. And ER put me on their board of directors, and it became part of ERA. So now it was a division, essentially, of ERA. And six months later their chief executive was fired, and they asked me if I would like to be chief

executive of the whole place. And so, I became Chief Executive of ERA, including my outfit. And I ran that for the next seven years, as Chief Executive.

[25:55]
How many people then were in ERA?

When, when I took over, there was about 250. And it was going downhill fast. There was a good finance director there, who I teamed up with, and between us we turned the place around and started growing it again.

Why was it going downhill?

pf! Why was it going downhill? Well, first of all, its history was such that, it had started off as a co-operative research organisation where industry paid half and the Government matched it pound for pound, up until about 1969 when the Government decided to withdraw, leaving these institutions out on a ledge. Either the industry supported it totally, or they became independent. The ERA had decided to become independent. But becoming independent requires a lot of things, not just, you know, I'm independent, now you've got to find the jobs, you've got to do the jobs to time, you've got to be smart with the project management and so on and so forth, which they weren't. Now, I had learnt all about that in the States. So, when I took over, we started to sharp up, OK. We got better project management, me, delivered on time, wrote to say we're delivering on time, with research projects, or, technical services, whatever they were. They were a mixture of research and technical services. And so, the place began to sharpen up. And as we sharpened up, we won more work, and eventually, by 1979 we had 400 staff, and we were profitable. You know, we were about, we were making about ten per cent on our total.
[27:33]
And so, at that point I was, I was approached by BT. BT had then privatised a couple of years. And it was 1987, and, I think they were privatised in '85. And they were looking for somebody to sort out their research and technology labs. I, I suppose I was at a point where, I knew every face in the 400, I knew my job well, and we had been flourishing, we had been growing and improving and so on and so forth. And so it wasn't an easy decision, but I did feel that I needed a change in my life, having been

on that side for twelve years essentially, five years with my technology centre and then merging it with the rest of the campus. It was a campus site. So I decided to go. And it wasn't for money, because, the board at ERA immediately offered to match whatever I was being offered, you know, to persuade me not to go. But, I just, I went for a change, and by golly, I found a change.

[28:40]
Because you were going to an organisation which had just recently been privatised.

Yes.

Used to be, but was now challenging, being challenged with some small degree of competition. Used to be a complete state-owned monopoly. Was finding its way out of being a civil service into a commercial organisation. And didn't have 400 people, had nearly a quarter of a million people.

Right.

And you were headhunted by them to head their R&D. What was the state of their R&D then?

Right. I was headhunted by a member of the board, main board, and the reason was that I had been active, in addition to doing my ERA build-up and so on, I had also organised all the independents into an organisation called the Association of Independent Research and Technology, AIRTO it's called, on the basis that, we had learnt how to be an independent; many of them were in the stage of learning, so, you know, we were able to, to teach them things; we were also able to learn things from them. We were also able to cooperate more effectively. There were, something like 44 independent research organisations. And our big problem was, when we tried to talk to Government, they heard 44 voices. And they said, 'Whoa, you know, we, we can't listen to 44 voices. Either you sort yourselves out, or, we're not listening at all essentially.' So, I persuaded everybody into an organisation called AIRTO, which became AIRTO, with two or three colleagues. And, that way we could approach

Government and, and speak in one voice, OK, about the independent sector. And AIRTO still exists today, I mean, as a, as a body.

[30:19]

So… I also was very active in the IEE, the Institution of Electrical Engineers, organising conferences, and doing things, and this, that and the other. And that's where this board director had seen me. And, he said, essentially, that, you know, 'He's the guy we want.' So…

Why did they want you then?

They wanted me because, they had a, as I found later on, they had a, a research organisation then, I reckon it was about, two and a half thousand, maybe going on 3,000, people. Most of it was at Martlesham. There were some activities scattered around the company being run by the divisions, development sort of activities. And, there was a research activity. And the big question I think for BT was, do we need this thing? It's costing us a lot of money, and a lot of the other divisions saying, why have we got it? You know, they don't seem to do much for us. And, thereby, you know, lay the nub of the problem. When I arrived at my office in BT, there was a stack of paper on the desk, and my predecessor had already gone, so I didn't have anyone to talk to. And I looked through all these papers, and it was the submission to the board for that year's funding, and it had been rejected. OK? So, it was a good start. And so I started ploughing through this lot to find, you know, why was it rejected, and so on. And what I found was, not untypical of British research establishments. Their question, the average researcher in the labs would be saying, 'Where are we going to get the money to do what we want to do?' And, I started on a different pattern. I said, 'Well, I don't want to hear anybody say that again. I want you to say, "Who are our customers, and what do they need from us?"' And, it's a huge cultural shift. It sounds like nothing, but, it's a huge cultural shift in their attitudes. And, when I went down to the site first of all, I jokingly say, I met them, and they stood sandal to sandal [both laugh], when I arrived. And the culture in, in a Civil Service type culture, was absolutely, massive. And it was a real, something of a shock to me. I knew I was going to get a change, but by golly, it was a change. And, you know, it was all unionised, right up through the management. Everybody had to have their square footage, and their coat stand and their carpet, you know, depending

on their rank. And, you know, none of which of course existed in my world. So, I had the unions, I had BT management if you like saying, 'What do we need these guys for? And we, we know research is a good thing, but why?' All the usual questions about research. And a huge cultural problem in terms of the people there, the two or three thousand people there, in terms of what they were there for.
[33:20]
So, I took the budget, the whole budget for the research and development organisation, and I gave it to the company. And I said, 'We won't have any budget this year. We will give you costed projects on what you want us to do.' OK?

Mm.

Only one small part of the budget I will keep, and that's, that's the portion called research. And it was, about fifteen per cent of the total.

What was their budget?

The budget at the time, I'm just trying to think, it was about, £250 million, or £300 million, something.

A not inconsiderable amount of money.

No. No, that's right. And of course, I, I knew very well from the world I lived in that that would, the pressure would come on that, and it would get chipped away, chip chip chip chip, until it was, you know, until it was down to nothing. So.

[34:12]
So you kept the research part.

I kept the research.

You said, that's ring-fenced.

Right.

We will do the research that we think is needed. The rest, you hand the money back, and…

We… Just like an independent research organisation, we will come to you, you tell us what your problems are, and we'll give you a proposal, and you may go outside and look and see if you can't get it better outside. And, we will deliver. Now, about 80 per cent of, of the projects we eventually won, but about 20 per cent went outside, to other organisations. And, I had to then look at the performance. I reorganised the whole place, on the basis of being able to do this kind of thing. I won't go into the detail of that, but anyway, on a matrix basis. And then, I started looking at the quality of what we did. And the project management frankly was, abysmal. Abysmal. Now, you cannot go along to intelligent research people and tell them that their project management is useless, even if it is. So, I had to find a way of actually introducing project management training across the company, because that was the, the key requirement first of all. They were very bright guys, and very competent, but still determined to do their thing. You know, that's what the fight was, they had to do their own thing. And I had to turn that round into an organisation that was looking at the company and saying, gee, where's the company going, what does it need? And the research at the back of all that should be saying, where are we going in the future? Where is the company going in the future? What are the skills that we need, what is the knowhow we need to actually furnish our, the body in front of us, the development body, and the services body, so that they are better than anybody on the outside, and cheaper than anybody on the outside?

[35:58]

So, anyway, I went… The one person I had recruited at that time was a finance guy. You need, you need a good finance guy. And I recruited somebody from outside. He was the only one I recruited first of all. I recruited two in the end, somebody, an HR person, and a finance guy. The rest were recruited from the people we had. But the finance guy, I said to him, 'I need a finance system where management in the organisation can know what the cost of everything is, and can know what the cost of a project is, and can manage a project knowing what the money is. None of them knew the money. They only knew two figures: the total cost of the organisation, and the total number of people. And that's how it was managed. Very Civil Service like.

Those were the two numbers. And of course, when I looked at that, how can you manage a business just knowing those two things? So anyway, I broke it all down. I put in the financial system, or my, my finance guy did, put in a financial system that allowed us to project manage. I introduced training, and I said to the senior ones first of all, 'Look,' I said, 'I'd like you to do this course. Of course you don't need it, but, if you do it, then when your guys come to you with questions, you'll know the right answers,' you know. So, we put them through first. And, [laughs] and then started on the next layer. And went through the whole organisation, all the management, and, to train them in project management, more effective project management.
[37:23]
In the meantime, I had given away the budget. And then, all the people in the labs said, this is the end of BT labs. You know, this is crazy. We can't possibly survive like this. We, we'll never survive. Anyway, we survived. And, not only did we survive, but BT had a quarter of a million people, and was determined to get rid of 100,000 of them. And in the ten years Iain led that, spoke to him, his job was really to, to get it down. We had something like thirteen layers of management. Well I had already introduced six, you know, in my reorganisation in mind, so I was resisting all the company plans [laughs], because I had already done it. But, in organising the management like that, the other thing was, the cost of overhead, you see, which, they had so many managers that were part of the overhead. And so we changed all that, as, as an independent would have to do. And made our pricing cheaper than anything they could get outside.
[38:24]
So the next question is, the quality of what we did. I mean they were very bright guys, very good guys, and in general, the customers were very happy with them, when they were working to a proposal, a project managed system.
[38:38]
So, all of that happened, and, although we gave away the budget, over the ten years when we went from 250,000 to about 150,000, the labs went from 3,00 to 6,000. Now the reason for that was, we provide development and technical services at their beck and call. So, we… I said to the guys, 'You've got to get very close to your customers. You've got a wonderful opportunity, because you're inside, not outside. You've to get to them, and you've got to understand their problems, and you've got to create projects which solve their problems,' you see. And so, over those ten years we

did that. And also, what happened was, the divisions that had their own development activities realised it was cheaper if they bought the services from us, so they turned their development people over to us. And so that's where the, a lot of the growth came. The other fundamental growth thing was that, the labs were doing the wrong things. They had, they were very much into fibre optics, and fibre optic components, and under-sea communications, which was good at the time, but, they were actually making stuff for industry, manufacturing stuff for industry, in this belief that this is how they were going to survive. Totally wrong thing to be doing. That's not what the company needed. So the more the company looked at them, they'd say, well, what's all this component stuff? You know, this is not what we need. We can buy this. So we… In that growth, we transformed the business from, we didn't do away with all the fibre optics, we still needed to know lots about fibre optics and, and be competent, but we, we introduced more and more software.

[40:17]

BT had fundamental software problems. If I give you an example. The main customer management system, the billing system, had, what, I don't know, 30 million customers out there, something of that nature, all coming in to BT, to be handled by, a few thousands of different operators, you know, that had the, the other end of the computer. The trouble was, the system had been designed in the 1970s, and had become a huge legacy system, to the extent that, if you printed out the software, it would be fourteen kilometres long, OK, that was the printout of the software that this central system had. Now that's fine, except for the fact that now we wanted to introduce new services. Well the architecture of this system was not designed to introduce new services; it was all mixed up to minimise, mostly to minimise computing, because in those days, the big problem was computing power. Now we have plenty of computing power. And we needed a clean architecture, so that, you know, the data could be separate from the, from the process. So, we had, we were faced with this massive IT problem essentially in BT. Well, I started off with a research and technology organisation; then they gave me procurement to run, in addition, then they gave me all the computing and IT to run in addition. And so I, I came up against this, this IT problem in the company, which, which when you looked at it, was, twofold. One was the legacy, that we had a huge system there. We, we would… We were faced with, every Sunday at 2 a.m. in the morning we had to take the entire system down, load the new software, run it up, and put it back online before

anybody noticed essentially, you know. And that happened almost every week, with a new, bugs, and the, and everything else. So, there was that huge technical problem on one hand.

[42:19]

The other hand was, with the IT system, every division in BT had its own ideas about what it wanted in the way of, of IT support, and IT systems. And Mr Bond was one of the worst. He wanted Mac; the rest of the company was on PC. You know? And, we had 46 computer centres around the country, all running their own local system. In fact, one of the examples was, IBM was recognised in 38 different ways around the company [laughs], on their computers, you know. And, so that, that was a massive problem. So we had a massive computing problem. We had a legacy problem, we had an IT customer interface problem, all at the same time. So those were the problems I had to tackle, or we had to tackle.

[43:06]

When you pull back to look at Martlesham Heath and the whole of BT R&D, how did it really compare with the best in the world, particularly Bell Labs and NTT research?

In terms of technical quality, it was, it was an equivalent. I mean, we had the, I can remember the Bell Labs director visiting, and I obviously toured him around. And what they did, wherever they did, they were very bright lads, they had been, been very well recruited, and it was a matter of direction rather than anything else. But, I had no complaints at all about the quality of the people, and the quality of what they did when they were given something to do, you know, they, they did it extremely well. They were very bright people. Our problem was, that people just went on from one thing to another, pushing on, and had done in the old days with very little recognition of what they should be doing. Mostly because BT wasn't given much direction. When I joined BT, going back to that moment, I got a phone call a few days before I was due to turn up for the first day saying, 'Don't come to the office today. Go to the airport and meet the chairman, you're going to America to sign a contract.' OK. Visit BT&D. And this idea was that we would manufacture optical components in, in conjunction with BT&D, with, with the labs doing the research and making the wafers and so on and so forth. I had nothing to do with the strategy of that, but I went along

and helped get it signed up with the chairman. So, when I came back, I was put on the board of BT&D, the joint company, which was supposed to be the lab supply and the technology, and then, the manufacturing understanding. BT knew nothing about the business of manufacturing really. I mean it wasn't that they weren't bright enough. All of these businesses require specific expertise. If you're a manufacturer, you have a different attitude to a research lab.

If you're STC, you have a different attitude.

You do. And there we were, manufacturing components, building under-sea optical systems for STC. And, and so on and so forth. That's what the labs were doing. And they were being faced with, we wanted to build, they wanted another £40 million to refurbish their clean rooms, to enable them to manufacture more effectively. And that's, [soft whistle], just imagine that. Why are we doing this? And, that was part of the change of the technology in the labs, to start directing them towards the future of the company, rather than, you know, what they were good at. But the people themselves were very high quality, and wherever they did anything, you know, it was, it was world standard. We did exchanges with, with the Japanese, and, we had lots of interplay with the Americans. I wouldn't say the labs as a whole were as good as Bell Labs, because Bell Labs had a lot more money, in their great days. And they themselves suffered when they, you know, when the real world arrived, and they had to be commercially, you know, viable. So, their wonderful achievements diminished a bit then, because there just wasn't the money for them to do exactly what they liked. Giving people, some people, freedom to do what they like, is, if you've got the right kind of people, it's great, will produce something. Whether it's any value to you in this decade is another matter, you know, I mean, it may not be, but it's still a great bit of research.

[46:47]

So we had to, we had to face the fact that, the company would start the squeeze. Sooner or later I knew we'd get the squeeze in terms of, of finance. The changes I introduced, what it did was, when the budget time came, and they're all round the table, and we'd got a billion to get off the costs, I would sit there, and then, when they start to attack me, as a, as the case, I would say, 'Look, 80 per cent of this budget isn't me. You guys are the guys who want the work. if you don't want the work, you tell

me, and we'll cut the budget. All I'm defending is the,' what had become about 50 or 60 million for standards and, and research. 'The rest of the budget, which had grown eventually to about half a billion, is your guys. You're the people that need these things, you know, not me.'

Right.

And, and by that means [laughs], I was running an organisation with half a billion, you know, which would have had no chance whatsoever as a research budget, no chance at all.

Yes.

But we were able, to keep that, we were able to furnish the labs properly, we built, and so on and so forth.
[47:54]
So, the change in terms of culture, in terms of aligning them with their customer, to say, there's the customer. I also set up a system for the research money. And that'll be another story. I set up a system for the research money on a practical basis again of saying, what we have to do first of all is get all the information we can from wherever in the business to decide, where do we think the business is going? Which direction? In which case, where are the technical problems going to be? Which are the areas that we, we're going to need? And of course the Internet came along eventually. But, that was the sort of question, you know. And we'll do research projects based on where the company is going, not research projects because it's interesting. We were not a national laboratory that was just experimenting. We were becoming a directive of the… Now, I had some fights over that, you know, because, people said, 'Oh well, you know, this is what we are, a national lab.' I said, 'No you're not.' Just think, who is your customer? And your customer is the person paying the bill. Think about that. And if he doesn't pay the bill, you won't be, you know, you won't be in position and nor will I be.

[49:06]

Right. You also had, obviously, you mentioned, quite close relations with a major group of suppliers to BT, historical suppliers, some of, in fact all of them no longer around really, who had been preferred suppliers. They were doing their own research and development, but they were also doing… Plessey for example, GEC, Standard Telephone and Cable, and Ferranti. Those were the big four, were they?

Yup.

OK. Can you tell me about the relationships BT had with them during this ten years?

Yes. Well I can tell you the relationships that, that I built. [laughs] My attitude to all of the suppliers was this. Whatever personal relationships we may have, you get no advantage from me, except fair play. So, you can be sure that I'm not favouring anybody else, and the procurement process will be based upon you meeting the requirements of the procurement. In terms of having better relations, better relations with them, I organised and funded a, a teamwork campaign, which was a sailing campaign in which they provided senior managers to join a crew, and BT sailing club made up the balance, OK. And I served on this thing. And we did major races, including the Fastnet race. And, this way, I liked it better than the idea of playing, going drinking and playing snooker or whatever they, they had done in the past. It was kind of, healthier. And, it also, you learn more about people when they're under a bit of stress than you do when they're at a drinking club or whatever they do, right? And so, you, you learn, people… And you get to like or not like people accordingly. But, for all of those that took part in that, which was most of those companies you've mentioned, they always had access to me, they, you know… I was quite a difficult person to get hold of, not because I was trying to be so, but because I was increasingly doing more and more things in the company. But I always took a call from them, or, or if they came, I always saw them. But the rule was, I wasn't… You know, even people that were my personal friends eventually, they always moaned at me because I didn't do them any special favours. And, and the idea was, you get fair play. You know, if you've got a problem, you can come and tell me about it, and if I think you're not getting a, you know, a fair response, we'll do something about that. [51:48]

In the first few years that I ran procurement, we probably provided BT most of their extra profits, because there was so much waste in the procurement process, not just for the major switching and so on, but, the example I always give is, the five and a quarter pound AXE, OK. Somebody sometime in the past had designed the ideal AXE for BT, presumably internally, and it was a five and a quarter pound AXE. Nobody made a five and a quarter pound AXE except they made it specially for BT. So it cost God knows what. Whereas there was a five pound AXE, and there was a six pound AXE, and there was a four pound AXE, at a tenth of the price. So, we went through on the procurement front, looking at wastage, you know, stuff that really, really wasn't doing anything for the company at all, and there was a lot of it. And we were spending four billion a year. So there was plenty of room for finding, you know, finding stuff.

[52:44]
How different were these companies? GEC was then run by Arnold Weinstock.

Yes.

He had built an organisation partly through organic growth, partly through takeovers, AG for example, and earlier on English Electric. And he ran it as a finance man, didn't he?

He did indeed.

Whether he had any technical strategic, technical strategy, I always doubted, and often complained that GEC didn't. STC was run rather like a financial organisation as well. Plessey I thought was a, seemingly different,. It was very much dedicated to the technology. And Ferranti was still basically a family company trying to survive. Is that a fair characterisation of them?

I think it is. Two of those companies tried to recruit me at different times, GEC and, and also Plessey earlier. The… You know, without getting in… I know a lot about the situation, but, I'm not sure that I want to be on the record for it. But what you just said is correct. I mean, Arnold Weinstock had the opportunity following the Second

World War of making GEC the powerhouse of Europe, but it was run very much on financial lines, and with very little, as far as I could see, technical strategy. He tried to recruit me at one stage, and, I remember, I sat in his office, and the phone rang, and he picked up the phone, and then, on the phone he was lambasting one of his chief executives, over £50,000, some item, I don't know what it was, being really rude to him. And I thought to myself, I don't really want to work for this chap, you know.

Mhm.

I really don't. And, so I, I turned down the, the opportunity. And, later, I was recruited as a board member of GEC.

You were.

Yes, that's right. But that was after I left BT.

Yes.

But, it had the opportunity. I mean, I don't know how much organic growth there was really. I think there was more takeover, and, at the end of it I think, Arnold Weinstock probably should have been a banker, and probably wanted to be a banker. And, he had a huge cash pile of course.

Enormous.

Yes, at one stage. And, he didn't really want to work on the technical strategy of the company, so he did all of these joint ventures with French and, and, all of which were a disaster really. Germans, Siemens, and… And made a huge problem later for, for GEC, because, all of them tied you down into something which, you know, which was run by the, the other party really. So you were almost a passenger on them. What he wanted to do was, get everything on, I think on a financial basis, so all he had to worry about was the finances and not the technical direction. But of course you don't make winning companies out of that, that approach. And, he in a sense laid the seeds for the later collapse of GEC, which I know a lot about. But, it was the fact that

wasn't a company being directed towards becoming a powerhouse of Europe; it was really a, a company that was being run on strict financial lines.

[56:02]
When you joined BT, in R&D to begin with, a significant event in that same year. A T1 connection was made from Cornell into Europe, wasn't there, there was a T1 connection?

Mhm.

That to a high grade. And you were a man with a telecoms background. And I've seen a big distinction made between telecoms people and networking people. And I don't know whether you think this is valid, and I can get your comments on this. Telecoms people have a, have a fear of the failure of a line, they have an absolute regard for the quality of the line, and the consistency of it, and, 99.999, and they'll, they'll work with that, [laughs] extra little percentage of reliability. Networking people say, yeah, it's gone down. Well, we'll put it up again.

Well mean, it's the difference between, you know, the, the Internet style of, of routing, and, and telecoms. The reason that telecoms had that fixation was because, that connection between… I remember I gave a lecture once at the IEE, and, part of the lecture, I instigated a phone call from me in the lecture theatre to somebody in IIT Research Institute in the middle of Chicago. And I was describing to the audience how these connections were made. Now that connection was a solid connection between us. Well, solid, I mean, it went… I don't think it went fibre optics; at that time it would probably go satellite. But, anyway, he picked up the phone. And I was describing how this thing had gone from here, to here, to there, to there, to there, and so on. Now, for a telecoms person, that is of prime importance, that connection, because it is a single connection. If I don't know all those bits aren't in place, I don't talk to him. With the networking type approach, and the routing type approach, you blast it out in a room, and it finds its way. And it may not find it that way; it may go that way or that way or that way, or part of it may go in different ways. And, there isn't the same attitude to knowing, because you don't know the route, you don't exactly know the route. And that is why you find a sort of cultural difference.

[58:19]

And the year after you joined, in 1990, BT was the first company in the world I understand to have its long-distance, what in BT parlance would be trunk network, totally digitised. So, it was really having an impact during that period of, of that decade though. What do you see as the highlight, highlights, coming out of the R&D department which really contributed to BT? Presumably one of them was video on demand, ADSL?

Yes.

That was '95.

Yes. It is often difficult to do… It depends what you think labs are there to do you see. I mean, the idea, if you're in a manufacturing business, the lab is there to produce elements of a new product or service, and it's not too different with, with BT. You don't produce a single eureka which goes through and makes a fortune. What happens, was, when you solve a particular problem to do something, bits come in from lots of different directions that make that thing in a sense unique, or competent, to do, to do the job that it's required for. And it's your level of skill and expertise that have come from these people, knowing their areas extremely well, that contribute towards that single product. In the labs, one of the things we did at that time was, we set up a marketing, building essentially, in the middle of the, Martlesham. And we put on display there, the future. So, the account managers would bring their customer along, and the line they would take with them would be: just ask, you don't have to worry about the future, BT will take care of it. You know, in other words, like everything else, everybody's concerned about legacy, they get hung up with a legacy system, and they've got to replace it. Don't worry about that, because BT is looking at it. Here's, here's the future. So we'll show you all of the things we have today essentially we were able to show them 20 years ago in a lab, you know. And, this turned out to be really popular with the, with the account managers and their clients. And it was one of the ways of coupling the labs into the business. We provided good speakers from the labs to go with the account managers and talk to the customers, to explain to them the technologies that are coming along, why they have to worry about

it, and why this will be a good thing and not that. And that turned out to be one of the sort of, major things of looking at your customer. And that, that centre there demonstrated most of these things, most of the things we have today were demonstrated at that time.
[1:00:57]
The big thing that caught everybody in the world out was the rate of growth of Internet, and how it came. Fortunately… I mean I can remember, every, every four years there was this big Geneva IT conference, huge international conference.

ITU?

Yeah. Nobody knew why you had to be there, but you couldn't not be there, you know. And, we went to one, and there wasn't a mention of Internet. Four years later, there was nothing but mention of Internet. In those years the whole scene had changed. Fortunately, we had people in the lab for whom we could say, 'Come and tell us about Internet. What is its strengths, what are the opportunities for us? What's it going to do?' During that ten years, you talk about, the big thing that BT had done is, gone to electronic switching. It had a huge programme of replacing mechanical switching with electronic. That was a big underlying thing.

System X and System Y.

Yes.

System X developed with Plessey and GEC.

Yes.

And System Y bought from Ericsson?

Yes.

Right.

Yup. And that had been the big capital programme. I mean there had been other things, but that had been the big capital programme that happened, and some fibre going in as well, the long, on the long hauls. Up until that point, in fact the period before I joined BT, one of the big things was, we used micro, or BT used microwave links all over the country, and one of the big moves at that time was to go to dual polarisation. Using the same link, at the same frequency, you can double the capacity if you can separate the two polarisations, transmitting different information on each polarising. In ERA, what my antenna people did, and what I was engaged in, was dual polarisation work. So we were able to provide feeds to transform these links. And we had contracts with the, we weren't the only people, but we had contacts with BT at the time to provide these feeds which would separate the polarisations. So, BT had had a system at that time based on, fundamentally on microwave links around the country, the long distance haul. And they were transforming, during that ten years they were also transforming much of it to fibre. And therefore the labs had done a huge amount of work on fibre, how to get it in, blown fibre, and stuff like this, and how to, the, the components you needed at the end of the fibre and so on.
[1:03:22]
So, that knowledge in, in the labs was essential at that time, to inform the company… Whether we… It wasn't that it had to be a BT lab component that went in. And that was the mistake a lot of people made, you know, that we have to manufacture, or why do we do it? What we needed was, the people that could go and look at what other suppliers had, and say, no no, that's the one we want, or, we want to spec much better than that, because we understand right down to the nuts and bolts how these things work. And, BT's venture into manufacturing, which I mentioned with BT&D, was a flop, in the sense that, in the end we sold the business to Hewlett-Packard, you know, I mean, because BT was not really knowledgeable doing manufacturing. And it was the wrong move. The reason they had gone in that direction I think, the strategy was always a problem with BT, and the reason they had gone in that direction was that, AT&T had manufacturing, and, so, they were kind of copying AT&T at that time.

Yes.

But it was the wrong thing to do.

[1:04:24]
OK. I don't quite understand why within ten minutes' walk of my house there are still two huge red brick buildings, separate, in separate directions, built in the 1930s, gorgeous buildings, GPO telephone exchanges. Why are they still needed?

Of course, it was all right when I left. That's my answer to that, you know. But, the truth of the matter is often that, the, the copper connections still terminate somewhere.

OK.

And if a huge, in the city, huge number of copper connections terminate in those two buildings, the, the job of actually merging that, is a hugely expensive job. And the question is whether it's worthwhile or whether you're going to supplant it with a totally different system.

OK.

You know, and override it. So, that, that's, that's one of the reasons I guess.

[1:05:16]
In the latter stages of your career at BT, you're in charge of IT, within BT.

Yes.

And, therefore you were two years away from the great scare of Y2K.

Yes, that's right.

Was that a con?

Well, I think it was a, over-egged, to be honest. And I say that, although, in ERA, when I was in ERA, which was before BT, we did a lot of work on, on that, because people were panicking about it. But I think it was a bit over-egged, yes. Yes, there certainly wasn't any great collapses or out… And, people would argue that was

because we, you know, we did all the work beforehand, but, I suspect it was over-egged personally.

Mm.

With IT, it was a different problem in BT. I mentioned to you, when I inherited IT, and looked at the issue there, the issue was, BT had multiple divisions, each very determined to do its own thing, and trying to supply from a central body, IT to all of them, was a challenge.

Yes.

And it was a customer challenge first and foremost. And, one of the things we changed, or I, I had changed and the guys changed, was, the specification of what they wanted. Part of the trouble was that, people didn't really know what they wanted. They thought they knew what they wanted sometimes. But before you had finished developing that, they were on to something new.

Right.

And therefore, trying to get the customer to fix and freeze his requirement in a knowledgeable way was a big challenge. So I put teams of people from the labs into the customer, to act as their agent, to help hammer out what it really was they wanted, before we started the job of creating the software to do it.

Yes.

And, that, that was a massive problem. And the way I solved Mr Bond's issue, when Mr Bond refused to have PC as he wanted Macs, was, to say to them, 'OK, well what we'll do is, we'll put this on a cost basis, because now we have an accounting system, we can do it. If you want a PC service, it will cost this much per installation; and if you want a Mac service, it costs this much.' And the Mac service is more expensive, because there's much less of you and it's, it's special. And, [laughs] that's how we did it. It curbed some of the more outrageous requirements.

[1:07:50]
Right. You were there when Prestel was sold off.

Yes.

Was that a mistake? Could you have gone somewhere else with Prestel? Could the labs have done something else with it?

[pause] I, I… Probably not, I think. There are… The thing is, BT hadn't really made up its mind through most of the time what it really wanted to be. And this was partly a result of its, its culture and its history, partly a result of the, the rules that were laid down upon it as part of the competition issues, and preventing us from doing some things which seemed, would have seemed not obvious. The one I came up against most was, I wanted to fibre Britain at the time, OK. And we worked out, we had the technology, and we worked out the cost. It was, you know, somewhere between fifteen and 20 billion, something like that, to do the whole nation. But we'd start with the areas that were, were most useful financially. But nonetheless, it was a big, a major, a major project, because, part of the trouble was that, if you go to fibre, then, you can't just run a fibre to you and not to your neighbour, and, or at least not have it in place ready for your neighbour, because, you know, the cost of that is ridiculous. You have to do it as a, area by area. And, I put together the plan on about three occasions, and I could never get anywhere with it, because the marketing people couldn't see any use for it. They couldn't see any use for broadband, beyond entertainment.

Right.

And the regulatory bodies would not let us put entertainment on the front.

No, because you would kill the cable industry.

Yes. So, BT was handicapped, to save half a dozen, well, a dozen maybe, small cable companies, you know. I mean that's the nutty sort of, thing. And although I argued

with the regulatory people and so on and so forth, I could get nowhere. And without getting them to say we could use, put entertainment on it, I couldn't persuade the marketing people there was enough there to support the case at the board. OK? And the finance committee. So, we didn't get anywhere with it.
[1:10:07]
So I took an alternative route. We did some studies, and we found that, if less than fifteen per cent of the population actually wanted broadband, then, ADSL could provide the, the means cost-effectively. If it got much above fifteen per cent, it made sense to fibre.

Right. Because ADSL would allow you to run video quality transmission, but on copper.

Well I went round all of the suppliers at that time, and I said to them, 'What I'm looking for is a box which will have fibre in at one end and will be able to deliver over a kilometre of copper, ten megabits.' OK? And, so they all sucked their teeth at that time. I went right round the world to do, talking to every one of them. And, about two years later, Alcatel I think was the first one to come back, and they said, 'We've got a chipset, and we could do…'

Who, who did?

Alcatel.

Oh. OK.

They came back first. Fujitsu were second. And they said, 'We've got a chipset now, we can do 25 megabits over,' I forget the distance, of copper. So you can have sort of, ten in one direction, and, and fifteen in the other if you want. So, we then prepared an ADSL revolution if you like. And when I left BT, the technology was all ready, OK, and we had, we had Fujitsu and Alcatel as the suppliers of the chipsets. And the labs were on top of it, you know, in terms of, and adapting it for our particular requirements. And, and that's another example of the labs, they didn't have to develop the chipsets; they had to be involved to make sure that it was all going to

work with our stuff. So… And then I left. And I think it wasn't until two or three years after I left that they actually introduced ADSL, for whatever reason. But anyway, eventually it was introduced.

[1:12:10]
You move on to GEC.

Well, when I left BT, when I retired, because I reached 60… I was the only person who ever retired from BT by the way, from the board.

Right.

I retired at 60, and at the time I took on a number of board appointments. One was GEC, one was GUS, Great Universal Stores, Lucas Varity, and, who else? Somebody else. Oh, WS Atkins; I became Chairman. So I took on a, a set of these organisations. I should mention, at the time I was also Chairman of the Engineering and Physical Sciences Research Council, which was spending all the money with the universities.

And GEC was running into deep trouble then, wasn't it?

No.

You don't think so?

No, I know it wasn't. I know what caused the problem with BT.

Well what caused the problem with GEC?

With GEC. What caused the problem with GEC is that BT got into… BT got into financial trouble over the… Well, what it started with was the licences, the broadband licences. And BT got stuck in a trap. The Government introduced an auction, which pushed the prices of these licences up sky-high. People like BT and Vodafone just had to keep bidding, because they had already invested hugely in, in

mobile, and, if you didn't get the licence for the next bit, then, your investment was virtually worthless. So they were stuck having to counter the bids. And the bids were coming from all over, people who wanted to break into, into the market. In the end BT paid £4 billion for its licence to go to broadband. Hadn't, built nothing at that point. The Government then pressed it to pay upfront. [pause] I believe the finance director at BT, who told me later that, that BT could cope, could cope with that, but the banks got rattled, and started putting pressure on BT over their cash position. And BT was then faced with the problem of, of cash flow. What they did virtually at the time… It was a time when the, when the broadband world or the, was a bit, was, well in America had gone into a shaky state, but in the UK it was still roaring along. BT pulled the lever overnight on all of its orders. Now, GEC was BT's biggest supplier. We were expecting, and anticipating, £750 million worth of orders in the quarter. 75 arrived. So, GEC hit the wall running. [claps hands] OK? The banks put pressure on GEC, because of, of the state they were in. And, that was the beginning of GEC's problem. Prior to that, GEC would have managed the, the downturn, as indeed they did after the event, you know, when, the recovery of GEC was still, Marconi at that time, was, was still active, but eventually of course a lot weaker after, after the squeeze. But that was, that was the big problem. It was that turning off of the orders overnight which actually killed GEC.

Killed the old GEC. Arnold must have been… Well he wasn't in his grave then. He must have been, furious.

[1:15:50]
Yeah he was. And he was trying to take it out on everybody I think, but, on the belief… Well, if you go back to the strategy of GEC, GEC inherited Arnold's empire, which was a load of joint ventures. And, the biggest part of the company, most profitable part of the company really, was defence. And we were getting from the shareholders enormous pressure to give up defence. Demonstrations and God knows what. And the company had to decide where it was going to go. Was it going to become a defence company, or was it going to become a telecoms company? Those were the kind of two options. And, it decided it was going to be a telecoms company. So it was going to sell its defence interests, and concentrate on telecoms. And, indeed, that was done. And in the end the defence interests went to BAE, and we, the

shareholders of GEC got shares in terms of, that lump of, of the company that went there, or a big part of the company went there. And then, GEC, or GEC-Marconi, Marconi as was then, turned to the telecoms business. They made two not very wise purchases in America, and the board agreed those, because they were persuaded by the executives that this was a good thing to be doing. And, they weren't very good. So, that was a weakener too. But the thing that finished off GEC was, was the overnight cut. But it killed Northern Telecom as well in the end.

Yes.

I mean that…

[1:17:32]
Yes. What was it like running the consultants Atkins?

Well that was another problem issue there. There was a, when I joined there was a management issue, major culture to the management, it was bifurcated into two groups. And so, my first thing was, either to bring them together or to decide which one to back. And I won't get into all of that, but that's what I had to do. And I did. And my second big issue in, there were two other issues in GEC – in, in Atkins. One was, we had taken on a huge job in Dubai, building the Burj Al Arab, the Arab tower, which became a distinguishing feature of Dubai, with all its thing that looks like a sail. And we, we had a huge job over, not only the, building the island, the tower, the, well, the marina, the hotel, the water park, it was a huge, huge project, and it got into trouble with the Sheikh, who was the customer. And I had to go and sort that out. So a lot of my time at Atkins was involved with that.

[1:18:55]
What mistakes have you made in your career?

[pause] That's a good one. The usual answer to an employer with that was, well you, you find out. I'm not telling you. [both laugh] What mistakes have I made? I think early on I could have been more confident than I was. I, I started off in life from a poor background, and didn't have the confidence that schools, the right schools pump

into you. So I, I think I lacked confidence. And, and that means I always stood back first of all to listen to what I assumed initially were people with more knowledge and more experience and more capability. And after a while I began to learn that, in fact they didn't have any more experience or capability than I did, and I couldn't understand how they were doing what they were doing anyway. So, I gained confidence through, through that means. But I certainly lacked confidence initially. I stood back. I wasn't ambitious at all. I was competitive.

Right.

I didn't have any plans to be this, that or the other. I just competed whenever I was faced, in a position to do.

[1:20:04]
You're a very logical man, aren't you?

I try to be about business, try to be logical. I think, the engineering training I did, and, I think was a huge benefit in that regard. One thing that always puzzled me about a lot of my colleagues was, they never seemed to think the system through. And I, we'd have lots of, lots of examples of that, reorganisations and so on and so forth, and I'd look at them and think, I don't know how that's going to work. Because, it seemed that their, their approach to it was quite different from mine, and I would have thought about the organisation and how it was going to work, rather than the other way round. I'll tell you a fundamental problem with Civil Service and with BT management, as a, as a Civil Service organisation, is, Civil Service organisations manage upwards, OK. The whole idea is to keep the minister happy, therefore, the layer below that, and the below that, always looking up to their bosses to try to keep them happy. They never look at the customer. And BT was like that initially. All that mattered was looking up at the gods, you know. And I tried to, some of the changes I tried to introduce was to say, 'Look at the customer,' you know? And, my job… Your job is not to please me. My job is to make sure your working conditions are effective, so you can do what we need to do. And, that is a management, managing down is an absolutely fundamental of, of proper management, I think.

[1:21:39]
We made a contribution to the, we've got a contribution to the archives from Peter Cunningham, who established a market research company in Menlo Park, in Palo Alto, called INPUT. And, Peter says that, technical decisions have much to do with emotional issues, and then people often use rationality to back up the emotional decisions they've made. Do you think that's true as well? Do you see that?

I'm sure that's true, not just about technical decisions, isn't it? I mean, you know, people will make a hypothesis, and it's true in research let alone anything else, and then they will look around for all the evidence that supports that hypothesis, and try to ignore anything that doesn't.

Right.

And I'm sure that is a fundamental all the way through in human thinking, you know. We always, we always try to reinforce our position by choosing the facts. There's a lot of it about today in science.

[1:22:38]
And that relates to your position on global warming and the effect of global warming in this country.

Yes. I mean, so many people haven't looked at the facts, and if you do look at the facts, you have to be filled with uncertainty, about, about things. And I have, you know, I have tackled the Royal Society on the issue. It doesn't make me popular. But, I got them to change their position to some degree, in that they were part of the, the 'science is settled' camp, and the science isn't settled. I don't think it's even right, let alone settled. But, certainly not settled.

You don't mind going against such an enormous seeming majority?

It isn't an enormous majority, actually, that's an illusion as well, that's a, a false… If you get into the facts of that, the basis of it. If you track these things down, and actually find where they come from, you often, you often find that it melts away as

you go down into the facts. That's what I found with each of the things over climate change and global warming. I took the issue, and then I tracked it back. And, it's a bit like a faith thing rather than a, rather than a science thing. You end up… You have to have faith, you know, that this is true, but the facts aren't there to back it up. There are no facts. And this is, I'm afraid this is true. And also, there are, it's not just me, there are a huge number of experts around the world that are in the same position as me. But, the thing I have feared most with the attitudes was this business of trying to prevent people who have a different view from speaking. And indeed, people lost their jobs, and still do, because the money now dictates the pace. You know, if a, if an academic institution becomes dependent on huge floods of global warming money, it's not about, not a very popular view to stand up and say, 'Well, I don't think this is right,' you know. You look at the amount of research on natural variability, compared to global warming, and you'll find that it's almost zilch on natural. And if you want to get research money, the easy way to do it is, look, I want to study frogs' legs, but, what I think I'll propose is that, it's the effect of global warming on frogs' legs, and I'll get my money, and then I can study frogs' legs, you know. And at the end of it I'll say, well I didn't see, find any connection with global warming, but that doesn't prove it isn't true. And you'll find that in lots of papers. So, I'm quite, I'm quite convinced the science is not settled, and I'm quite convinced that nobody actually knows what the climate's going to be in 100 years' time, and I'm quite convinced that a lot of the stuff is propaganda, and is not factual at all.

[1:25:15]
Are you concerned about the likely impact of artificial intelligence? There is another, concerns there, in the public mind, about the destruction of jobs, and also perhaps about the replacement of human intelligence.

Mhm. Well, without… I haven't made an issue of it, you know, I haven't studied it, but, I would say it's no different, is it, from, you know, going back to robotics and, and all the attitudes to automation, which were going to kill jobs. In fact, what it does do is, it often creates a different kind of job. And, the more automation you have, and the more the work gets done by machines, and even if it requires thinking, then, the more time you have for services. In other words, we have an economy based on services, but unfortunately we don't have an economy based on earning our living.

And services are a scratching your back sort of feature. They make life more pleasant, you know, if you look around here, there's nothing but restaurants and coffee bars. I don't see any industry around here very much. And, that's all very fine, providing you've got something earning the, the moneys to, to pay for it all. So, as far as artificial intelligence, I would say it's too early to say, and you have to take these things as they come. You're not going to stop it by fearing it. So you might as well let it develop. And it will be like, it'll be like the atomic bomb, you know, or nuclear energy, you know, on one hand there's a very nasty use of it; on the other hand there's a very useful for mankind use of it. And, I'm sure artificial intelligence falls into the same camp.

[1:26:53]

One of the major tasks that I had while I was employed at BT and beyond was that I was asked to become Chairman of the new Engineering and Physical Sciences Research Council. This required a number of things. One was, to make the case to Government as to why it should be spending billions on research, and, also to change the message that, that if you like, the scientists and the researchers try to feed back to Government to justify the moneys they received. By and large, researchers tend to justify what they do on the basis of breakthroughs and inventions, but if you are a hardnosed accountant, and added up the total spend against the number of those, you'd say, well this is very poor return for our money. In fact they're making the wrong case. The case, the reason why Government spends that money, primarily with the universities, but some with other institutions, is to actually, to generate new knowledge and expertise, and to prepare the nation for the next generation of technological change. By feeding the money into those, you develop expertise and experts, which feed out into all aspects of government, commerce, industry, and provide us with the background capability to deal with a world of change. This was not generally recognised, and, and I try to use this argument to explain why you should spend the money at all. We then had to organise the way we funded our projects, and how we chose our projects, to justify that position. And this was done by creating a, a map of, a technological map of the needs, looking to the future, and taking the evidence from everywhere that one could. Foresight was one of the programmes that provided input, from talking to academics, to talking to industry, to talking to Government. And to mapping out a map that says, these are the broad areas that we think are going to be important. And then to set up our organisation so that

we actually offered projects, not defining the projects, but expecting the researchers to define the projects, and to be properly evaluated, to mine knowledge in those areas. And really, the whole process is one of mining knowledge and growing expertise, not only in what you do, but what you learn from people doing similar things around the world. And with that knowledge you then have to say, and how does it flow out into the community? It flows out on the hoof, because, people leave universities and go out into the world; it flows on in the relationships with industry, and working on joint projects; and it works on people going into government and so on with the knowledge. And it's an essential part of a modern industrial state that that knowledge flows into the community.

[1:30:03]

So we tried in various ways to improve the way that projects were done, but not tell the researchers what projects they should offer, except for the broad outlines, where we thought the knowledge was necessary. And then, to look at how it was flowing out, by what means, and try to encourage it. And I think by this means, if you look at it as a part of the process of educating a nation, in technological expertise, it is a very key aspect, and the money spent should be set against that, not against the occasional sparkle of a breakthrough, and an invention. So.

[1:30:41]

You have been, as I said in the opening, been called one of the top technical minds in the country, and so thank you very much for your inspiring contribution to the archives, Sir Alan Rudge.

Thank you.

[End of Interview]